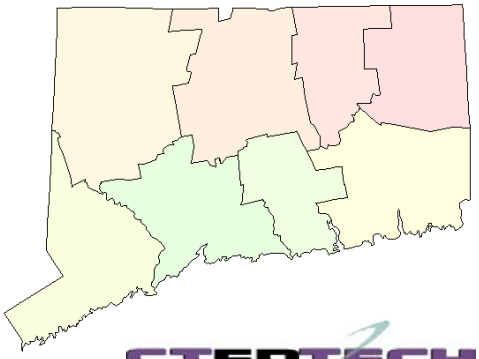
Connecticut Education Network

HIGH PERFORMANCE STATE WIDE

K-12, HIGHER EDUCATION AND LIBRARY NETWORK

INFRASTRUCTURE BUILD-OUT UPDATE

January, 2003



DOIT

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Department of Information Technology
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Connecticut Education Network Infrastructure Project Update

Project Overview

Through the leadership of the Governor's Office and the Connecticut General Assembly, the Department of Information Technology (DOIT) has been directed to develop a new state of the art communications network to interconnect all public K-12, public and private higher education and library locations throughout the State of Connecticut. The Connecticut Education Network (CEN) is enabling new collaborative opportunities among all connected sites and will provide expanded secure network capabilities for individual schools wishing to access each other or the Internet.
The Connecticut Education Network is a combination of physical and virtual network technologies that will deliver optimum connectivity on a "one step ahead of demand" basis now and in the future.

As recently as spring 2000, Connecticut was one of the few states without a statewide education network. Now Connecticut is rapidly moving beyond other States and is becoming a leading reference State for advanced education networks. Broad deployment remains bounded by resource availability in a difficult economy, but the progress is nonetheless substantial and promising. As the mid-point of the 5-year legislative mandate to implement the Connecticut Education Network[1] is reached, the State has completed the steps prerequisite to complete the Connecticut Education Network within the proposed timeline and continues to make substantial progress in connecting schools, libraries and colleges to the network.

This status update describes progress and planning for continued progress.

School and Library Surveys

The first year of the project involved an intensive on-site review of the networks that were in place in all 160 school districts in Connecticut. A team of dedicated individuals from DOIT, along with targeted accompaniment from the Department of Education, visited every school district in Connecticut. The survey process resulted in the first verified and comprehensive review of network wiring, network electronics, and wide area network strategies throughout the State.

As a result of the surveys, a report was generated to each district that described deficiencies and directions to allow the district's future interconnection to the Connecticut Education Network.

Due in part to Federal USF support, the Hartford Public School's Metropolitan Area Network is one of the most robust educational and municipal networks in the state.

[1] **Public Act 00-187** Sec. 35. (a) The Commission for Educational Technology shall develop, with the advice and assistance of the State Board of Education, the Board of Governors of Higher Education and the Department of Information Technology, a five-year plan for the implementation of the Connecticut Education Network to provide state-of-the-art, high-speed, reliable Internet access and video, voice and data transmissions that electronically link all educational institutions in the state, including public and independent institutions of higher education, the state's libraries and all elementary, middle and secondary schools and other institutions including businesses, job centers and community organizations.

The survey process also resulted in seven broad recommendations to the Commission for Educational Technology, which outlined critical areas where additional State attention was required. These seven recommendations for state-wide consideration are as follows:

- State support for educational technology through the Department of Education's educational technology infrastructure programs should shift focus from building in-school networks to 1) preparing schools for connections to the Connecticut Education Network, 2) Upgrades of in-district networks and 3) Continual renewal of now outdated equipment.

- A state-wide effort is required to construct "building entry conduits & infrastructure for optical network cables" between school buildings and the public-right-of-way.

- The State should continue to create contract mechanisms to allow schools to use one-time construction, bond and capital funding to implement and fund the long-term operation of their inter-school networks.

- The Commission for Educational Technology and the Department of Education should study the impact of extending school construction bond funds eligibility to include a greater portion of the network construction within a school, district or region as part of building construction and renovation.

The Institute for Exploration at Mystic Aquarium uses the Connecticut Education Network for a full motion video connection from underwater research cameras in Monterey, California. Under a sponsorship agreement with the University of Connecticut and Internet2, the video feed can be accessed at the Aquarium and in CEN connected Connecticut schools.

- The Commission for Educational Technology should seek support to create a comprehensive and coordinated regional technical support program for school districts and libraries that uses a combination of regional educational service centers, higher education institutional support and DOIT services. This program should provide direct technology support, teacher training, and technology and training assessment across the state.

- The Commission for Educational Technology should seek support to fully fund not only a single Connecticut Education Network connection in each district, but also additional connections to all high schools and all middle schools in Connecticut by no later than July, 2005.

- The Commission should communicate to local authorities that connections to elementary schools and branch libraries from each town's state-supported sites will remain a local responsibility.

Network Architecture

Concurrently with the school survey process, the Department of Information Technology invested a significant effort in mapping the network architecture standards used by the state government network for use in an educational environment. Business requirements and operational policies developed by the Commission for Educational Technology were reviewed by a team of network architects and engineers from DOIT, the University of Connecticut, Yale University, and several advanced school districts to assure that the long-term technical strategy for the CEN would accommodate present, future and even unanticipated needs.

DOIT's Network Lab allowed the DOIT CEN team to test advanced multicast video streaming and Internet2 connectivity.

As a result of this design effort, the Commission for Educational Technology adopted an "all optical" backbone strategy to make Connecticut one of the first states to extend the long-term capacity of fiber-optic services between its K-12 school districts and higher education campuses. *Unlike many states that are burdened with earlier generations of network technology, Connecticut's lack of any legacy education network has allowed DOIT and the Commission to jump directly to contemporary long-term Internet technologies.*

The CEN network architecture adopts the Department of Information Technology's strategy of remaining vendor and technology neutral, so that the CEN team has been able to use the network services of many private companies, including Cisco Systems, SBC Communications, Fibertech Networks, and others to develop a long-term infrastructure for the CEN. DOIT's objective of maintaining a menu of services available from multiple vendors has also allowed the CEN team to choose network components from a variety of vendors, blending the best fit of vendor offerings with each CEN business requirement.

Deployment of Connections to K-12 School Districts

The Connecticut Education Network officially was "live" and carrying Connecticut school district connections in August, 2002. The CEN has a robust new Internet filtering system to protect students from unwanted network content and redundant high-speed fiber optic connections to the Internet through the Department of Information Technology and the University of Connecticut. Derby, Danbury, Shelton, West Hartford, Hartford, and Salem were the first districts to come online. Since that time, the CEN has delivered connections to many additional towns across the State. Many of the districts have "cut-over" and are actively using the CEN. Others are in the final planning stages of making the switchover to the CEN.

Connecticut Education Network K-12 Connection Availability (as of December 1st, 2003 **)		
1. Ansonia	10. Hartford	19. North Haven
2. Bristol	11. Meriden	20. Orange (Amity Regional)
3. Canaan	12. Middletown	21. Plainfield
4. Cheshire	13. Milford	22. Salem
5. Danbury	14. Naugatuck	23. Seymour
6. Derby	15. New Canaan	24. Shelton
7. East Haven	16. New Haven	25. Wallingford
8. East Windsor	17. Newington	26. West Haven
9. Hamden	18. New London	27. West Hartford

** Cromwell (28) and Wethersfield (29) will be added as a result of under budget expenses on leased fiber activities.

Partnership with Higher Education Adds Services and Support to the Network

The University of Connecticut has played a leading role in the development of the Education Network, through the near full-time contribution of project engineering and management talent, access to the University's advanced Internet2[2] services, and through physical interconnection of the University's network to the Connecticut Education Network. The University has also contributed access to special Internet2 consortium pricing, which has allowed the Connecticut Education Network to connect to the commercial Internet for nearly 60% less than traditional Internet Providers would charge for equivalent services.

UConn has also offered to expand its partnership with the State by hosting the comprehensive network technical support and training support program recommended to the Commission as a result of the on-site school survey process.

Finally, pending release of additional funding, UConn will extend access to Internet2 to not only other CEN-connected Higher Education institutions, but also to the CEN-connected Connecticut K-12 and Library locations. Through Internet2's Sponsored Educational Group Participant (SEFP) program, Connecticut's schools and libraries will have access to the same infrastructure and content that is available to the leading research institutions on Internet2. These resources range from distance-learning systems to high-speed access to super-computing centers and marine research facilities.

Connections to Libraries

Since the earliest inception of the Connecticut Education Network, the Connecticut State University System has been advocating the need for a high

2 Internet2 is a consortium being led by over 200 universities working in partnership with industry and government to develop and deploy advanced network applications and technologies, accelerating the creation of tomorrow's Internet. Internet2 is recreating the partnership among academia, industry and government that fostered today's Internet in its infancy. The primary goals of Internet2 are to: 1.) Create a leading edge network capability for the national research community, 2.) Enable revolutionary Internet applications, 3.) Ensure the rapid transfer of new network services and applications to the broader Internet community.

speed education network in Connecticut. Under CSU's leadership, the first physical interconnection with the Connecticut State Library and the University of Connecticut formed the precursor to the Connecticut Education Network. Beginning in 1999, CSU interconnected 18 libraries that were not served by Internet services. Upon initial funding of the Commission for Educational Technology, CSU also provided the leadership to develop the technical support mechanism for the Connecticut Digital Library, hosting the technical support and services required to bring digital library resources to Connecticut.

In July, 2002, the State of Connecticut's Digital Library *ICONN.ORG* became part of the Connecticut Education Network through a high-speed optical interconnection to the Connecticut State University. CSU still provides technical support and server-based resources for ICONN at its System Office, while the CEN now provides high-speed transport to connected sites. Through the CEN and the Internet, all Connecticut Public Libraries, Higher Education Campuses, and School Districts now have access to the Digital Library. CEN-connected sites have additional performance and capacity to access digital library resources as additional multimedia content is added to the databases. In August, 2002, DOIT followed through on the commitment to take over 18 library connections formerly operated as the Connecticut Library Network by the Connecticut State University System.

Before deploying the CEN Network, the DOIT CEN team built the entire statewide network in DOIT's East Hartford lab facility.

In spite of limited operating funds for the monthly service fees that these types of connections are funded with, the CEN continues to support the connections. When additional funds are released, the CEN will also support connections to those towns where CEN K-12 services have been installed.

Other Higher Education Contributions and Connections

Connections to the University of Connecticut, Connecticut State University, Community Technical Colleges and Charter Oak State College were completed in December, 2001, creating a high-speed interconnect between the State's public institutions, the CEN and State Government. Subsequently, the University of Connecticut and the Connecticut State University have transferred large portions of their inter-campus networks from dedicated facilities onto the shared backbone of the CEN. Through cost-sharing agreements with the CEN, the sharing of the CEN backbone has resulted in significantly improved performance to the individual campuses at similar or lower costs to what the individual institutions had paid for smaller connections.

Charter Oak State College, Yale University, Trinity College, Wesleyan University, the University of New Haven and Albertus Magnus College have also received connections to the CEN.

There have been a series of conversations hosted by DOIT among the Chief Information Officers and Network Directors at these and other colleges regarding the CEN and educational content contributions to K-12 in Connecticut. This technical group is actively pursuing linkages to educational resources at

each college to not only catalog existing higher education interactions with K-12, but also to enhance those efforts through the CEN's new capabilities.

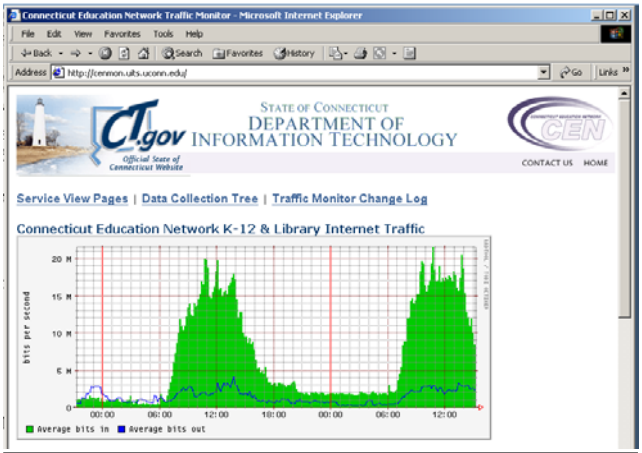
Colleges connected to the CEN are also investigating the cooperative purchasing power enabled by the CEN. Several sites are planning on using the CEN to expand their research capabilities through the Internet2 and commercial Internet connections offered on CEN by the University of Connecticut.

The higher education group is addressing cost sharing for these services and will be prepared to support staffing and operating costs for services on the CEN that are targeted to specific higher-education needs. These contributions, in addition to the University of Connecticut and Connecticut State University commitments for cost sharing will make the higher education component of the CEN program nearly self-sufficient.

State of Connecticut E-Gov Web Portal Hosts CEN Public Information

As the Connecticut Education Network came online, the Department of Information Technology unveiled a new Internet Web page, under Connecticut's E-GOV framework, for the Connecticut Education Network. The site includes not only policy, architecture, filtering, security and technical details about the CEN, but also real-time status monitoring and network traffic accounting for the individual connected sites.

The CEN portal also includes private information for each school district, including reporting data collected by DOIT as part of the on-site school survey process. The portal allows DOIT, the CEN and the Department of Education to maintain current information about each individual school district's technology programs and is now actively used in evaluating grant applications from school districts for Department of Education technology programs. The CEN portal also allows the CEN team to publish news updates to connected participants and interested parties about CEN activities.



The CEN web site (http://www.ct.gov/cen) on the State's E-Gov portal includes detailed information about the CEN as well as real-time traffic monitoring of each connected site.

The CEN team has also established several email distribution lists, including a "change log" which is used to notify connected sites about upcoming off-hours maintenance and expansion activities on the CEN. The "change log" distribution lists can also be used to update connected sites about operational issues that may arise on the CEN.

Completion of Phase I & 2 Network Backbone

Following DOIT's policy to blend the best services available from the private sector with matching State needs, the first phase of the Connecticut Education Network deployment included purchase of services from SBC Communications for circuits to interconnect the higher educational institutions, a set of pilot K-12 school districts and the new State Data Center at DOIT in East Hartford. These initial

services included contracts for high-capacity optical lines from SBC and acquisition of Cisco network equipment to activate services into each of the connected facilities across the state. Phase 1 activities also included acquisition of network security equipment, including firewalls, intrusion detection devices, and network analysis "sniffers". All of these facilities were installed in late 2001 and early 2002 in the DOIT data center and the 16 remote sites across the state.

As the legislature shifted funding for the CEN from operating funds to long-term bond funds, DOIT shifted a portion of its deployment approach from the short-term SBC monthly services to longer-term optical fiber lease arrangements for the second phase of the Education Network roll-out. Phase II purchases included a 20-year "indefensible right to use" lease for fiber-optic cable connecting East Hartford, Middletown, New Haven, Milford, Ansonia, Waterbury, New Britain and Hartford. From this State-controlled fiber-optic backbone, over 35 sites were connected with matching 20-year fiber-optic cable leases. Additional SBC services were also ordered to K-12 sites. Both the SBC and Fibertech approaches leave the installation and maintenance of the physical network elements in the private sector while allowing DOIT the flexibility to provision advanced network features for the educational and research activities on the CEN.

Ansonia High School serves as one of 6 hub sites for the CEN's leased-fiber optical backbone ring. In addition to serving surrounding school districts, the site has redundant connections to the Rowland Center to the north, Southern Connecticut State Universtity to the South and directly to East Hartford via an SBC circuit in Shelton to the West.

Hub sites for the leased-fiber portion of the network were established at key government[3] and educational sites in Connecticut, assuring long-term high-bandwidth capacity for the Education Network as a capital investment. The distribution of the hub-sites and the closed-rings that interconnect the hubs with the school sites also ensure a high-level of redundancy, which dramatically increases the reliability of network services into each site.

DOIT is actively pursuing additional contract arrangements that will allow additional private provider services to be acquired as long-term bond-eligible services. An Invitation to Bid was issued in November 2002 that is expected to provide a new opportunity for vendors to propose bond-eligible services including leased-fiber, managed services and more traditional network services.

Universal Service Fund Application

The Commission for Educational Technology with DOIT's assistance has begun the process of submitting a statewide Universal Service Fund application to the Schools and Libraries Division of the federal Universal Service Administration Company[4] in January 2003 for the "year 6" federal funding window (FY '03-04'). The submission will leverage the FY'04 $25,000,000 bond and $6,000,000 operating fund budget requests to complete the build-out of the network ***to every town in Connecticut***

[3] Leased Fiber hub sites have been established at the Department of Public Safety in Meriden, Central Connecticut State University in New Britain, Southern Connecticut State University in New Haven, Ansonia High School, the Rowland Center in Waterbury and the Department of Information Technology in East Hartford.

[4] The Universal Service Administrative Company (USAC) is a private, not for profit corporation that is responsible for providing every state and territory in the United States with access to affordable telecommunications services through the Universal Service Fund.

by June, 2004. Assuming network expansion progress during FY'03, completion of the State by June, 2004 is aggressive and achievable. In anticipation of the USF application, the Commission for Educational Technology is contracting for personal services to assist in the submission of the Statewide E-Rate application.[5] DOIT has issued an invitation to bid to solidify best pricing and USF eligibility for key services. The bid includes invitations for vendors to propose managed network services, leased fiber, Internet services, and other components in a format that will be both USF and bond eligible. This bid was opened in December 2002 and will be awarded by February 1st, 2003.

The USF process is complex and tightly controlled by regulations. The Commission and DOIT are continuing to make assumptions based upon those federal rules as well as State bonding rules. The USF proposal is designed around current understanding of present bond allocations, the Commission's next biennual budget request, and contract cost estimates to finish the network next year. The relationship between FY'03 expansion progress, the design for the remaining sites in FY'04 and operating and bond funds availability in FY'04 increases the complexity and risk of submitting an ineligible federal application in February, 2003. The Commission will be forced to make several predictive assumptions in advance of a difficult spring 2003 legislative and budget process in order to submit the application.

Although the USF program will not reimburse the State for all of its CEN activities, DOIT hopes to achieve a 50% reimbursement from USF for those activities that are eligible in FY'04. Assuming that $10,000,000 of activities planned for FY'04 are eligible, the State expects to accomplish $20,000,000 in actual work as a result of the additional USF funds.

Network Filtering and Internet Services

Connecticut was one of two state education networks participating in the development of a new network filtering product by N2H2 Corporation. N2H2 adopted its industry-leading child protection network filtering product specifically for the Connecticut Education Network, by adding the capacity for "delegated administration" from the State to be assigned to each city and town. The new technology allows schools throughout Connecticut to administer their own policies regarding appropriate content, while also assuring that federal standards for network filtering are met on a state-wide basis.

The Connecticut Education Network now has two fully redundant high-capacity Internet Service Providers, with optical interconnections to each. The capacity of these providers has already greatly increased the response-time and capacity to school districts connected to the CEN. In several instances, school districts that previously were restricted to 1.5 Mbps connections to the Internet realized 3 Mbps or more of throughput on the very first day they connected to the CEN. Some school districts are individually pulling as much as 8 or more Mbps of content from the Internet, the equivalent of over 200 individual telephone lines.

Assistance to Schools and Libraries from the Department of Information Technology

As a continuation of the CEN survey process, DOIT has been assisting schools on a special case basis with various networking and information technology development efforts. In some cases the CEN team has assisted in increasing network security, installing performance management tools, or troubleshooting data flow across a network. In other cases, the CEN team has consulted with district or

[5] C.G.S. Sec. 4d-82 (b) The Commission {for Educational Technology} shall oversee the preparation and submission of a state-wide application to the federal Universal Service Fund to enhance connectivity to the Connecticut Education Network, maximize participation and grant attainment rates, and reduce overly burdensome administrative requirements which discourage local involvement.

municipal information technology planning efforts, assisting in long-term strategic planning that matches local efforts with State and Federal initiatives. DOIT is also continuously and actively updating its CEN website to reflect best practices throughout Connecticut in educational networking and IT support.

As the CEN network has expanded to additional districts, campuses and libraries, DOIT has begun planning for expanded services for CEN participants. One concept under consideration would create a CEN Advanced Operations Center which would have a Special Network and Tactics Team ("SNAT Team") to assist schools with design, planning and implementation of advanced educational technologies. Under the "snat team" approach, the State would support a small extremely high-level team that would be available to all CEN participants. For all but the largest educational IT departments, this DOIT team would provide skills and resources that would provide a diversity of talent and level of skill that could not be reasonably justified within a single town or district.

Advanced Applications and Internet2

Interconnection of the Connecticut Education Network to the international Internet2 backbone through the University of Connecticut will allow Connecticut educators to access an unprecedented capacity for multimedia educational services. Through Internet2, CEN participants can access digital television quality video from national marine life sanctuaries or participate in multi-state educational distance learning hosted by the Internet2 program in its virtual national distributed environment for research and education.[6]

Internet2 also allows an invaluable advanced planning and architecture framework for Connecticut Educators through its middleware, network and content development efforts. For Connecticut users, these services provide actual educational content in the context of next generation services that can not yet be supported by the commercial Internet. [7]

Internet2's membership fees for State Education Networks are based on the number of congressional delegates a state has in Washington. Connecticut's anticipated connection of the CEN to Internet2 will add it to a list of over 30 other states that are interconnected to the high-speed research and education backbone.

Partnership and Synergy with Other State Agencies in CEN Activities

The Department of Information Technology has received assistance from several other State agencies in the deployment and operation of the Connecticut Education Network. High level individuals in the Department of Public Utility Control, the Department of Public Safety and the Department of Transportation have significantly increased awareness of the CEN program with their constituencies and have coordinated some agency resources to assist in the Education Network deployment.

The Connecticut Education Network's architecture and capacity make it uniquely positioned to serve as a critical training and operational infrastructure not only for K-12 to Higher Education initiatives, but

[6] Information on the Internet2 commons and its capacity for distance learning can be found at http://commons..internet2.edu .

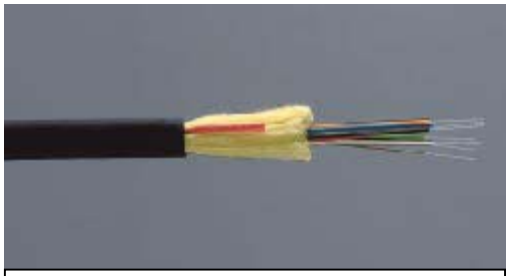
[7] More information on the Internet2 program is available at http://www.internet2.edu .

also for other Government activities that may require immediate, robust, redundant and reliable information transport to locations throughout Connecticut.

As the CEN's high-bandwidth connections reach each town, the opportunity exists to make marginal additional investments to provide services for other critical state and federal initiatives that reach into these towns. By example, the CEN infrastructure provides the capacity to deliver services commonly found in municipal and school sites ranging from first-responder training, to public health education seminars. The network's inherent capability to carry voice, data and television quality video also gives it the capacity to enhance community involvement in local and state government. The network also has the ability to act as a public safety tool for emergency-response communications capacity into each town.

Optical Network Positions Connecticut ahead of other States

Early progress on the Connecticut Education Network has already moved Connecticut from one of the few "no educational network" states into an elite group of "cutting edge optical educational networks." The change to bond funding has necessarily forced the use of long-term contract arrangements including the construction of fiber-optic facilities that reasonably assure a technical lifespan that matches the 20-year term of the funding. The use of optical cable to all K-12 and Higher Education sites assures that present and future needs can be accommodated by the simple upgrading of equipment at each site. California, Texas, Illinois and others are just beginning similar network roll-outs.



Fiber Optic Cable underpin's Connecticut's adoption of an "all optical" backbone strategy for K-12 and Higher Education sites.

Because the bond-funding has allowed the fiber-optic portion of the network to be designed as a long term capital investment and "construction project," the CEN team has been able to coordinate with its vendors to install fiber-optic "rings" to many of the connected sites. The redundancy offered by connecting each site into a "ring" increases the resiliency and capacity of the network in severe weather or disaster, while also decreasing the staff required for off-shift response to failed links.

Although the CEN now reaches only about one quarter of the State, it is nonetheless perhaps the most robust, redundant and future-positioned education network in the nation. With continued support, we will have almost 40% of the State complete by June, 2003 and a realistic prospect of completing 100% of the State by June 2004.

Project Update Addendum – Network Operating and Expansion Planning

Network Operating and Expansion Approach

As the mid-point in the statutory timeline for implementation of the Connecticut Education Network, we are on track to complete the project within the specified time. Planning for completion of the network over the next 30 months includes a multi-pronged approach that assures that every school district, library and higher education institution is connected to the CEN by June, 2005.

DOIT intends to increasingly rely on the federal Universal Service Fund to supplement funding available from the State in completion of the K-12 and library portions of the network. For the backbone, which is shared with ineligible higher education connections, the approach is likely to continue using USF only for those components which are clearly eligible. Shared backbone components that are used for higher education and K-12/Library purposes will not be included in USF applications. Those components that are clearly dedicated to K-12/Library purposes will be funded through USF when possible.

Assuming allocation of some portion of the $10,000,000 budgeted for FY'03 during spring, 2003, DOIT will sustain operations and possibly expand the network slightly under the proposal options listed below. Beginning in July, 2003, under a new biennial budget, the CEN would expect to complete deployment of the CEN to all remaining K-12, Library and higher education sites in Connecticut.

FY' 03 Phase III and FY '04 Phase IV Network Operating and Expansion Plans

As the CEN network interconnects larger numbers of sites throughout Connecticut, the operational cost of the program is increasingly rapidly. Monthly service fees for SBC services, Internet access, filtering contracts, equipment maintenance costs, and staffing are essential as large portions of the network transition from vendor supported construction and deployment into operational maintenance. Many of these operating fees have bi-weekly, monthly or annual costs that can not be assigned to bond funding, except as transitional and project management fees.

In response to a difficult budget climate and great uncertainty as to whether additional funds will be forthcoming beyond the $10,000,000 already allocated in FY'03 bond funds, DOIT has prepared three budget scenarios for the expenditure of those funds.

Option 1 - Secure Continued Operation of Current Sites for 30 months through June, 2004

The first option uses $7.6 M of the existing $10M bond allocation to secure the present operational state through the remainder of the next fiscal biennium. This approach maintains the State's commitment to those sites that have transitioned off of other services onto the CEN by entering into long-term arrangements for those services and components that normally would be funded through operational funding streams. Although likely less efficient than the preferred operating models, this approach assures that current progress is sustained and that the State remains positioned to move forward from its present position when funding is released.

- Maintain services to all existing connections through June 30, 2005
- Secure 30 month contracts for all typical "operating costs"
    - Annual: Internet Services, Equipment Maintenance, Fiber Maintenance
    - Monthly: Commitments to existing K-12 and Library Sites
- Transition existing higher education sites to long term contract vehicles

- Create MOU for long-term staffing and operational support
- Adjust backbone to be in a "no changes" position for 30 months

The high cost of this option to "stay still" is largely a factor of normal operating costs multiplied over a 30 month period. Approximately $1,400,000 would be used to migrate existing monthly services to long term contracts. The remaining $6,200,000 would be used to pay 30 months of costs for those services typically funded on a monthly basis.

Option 2 – Secure Continued Operation of Current Sites for 30 months and continue minimal growth

Under this scenario, the DOIT would undertake the same steps as Option 1, but would also use the remaining funds from the original $10M bond allocation to continue build-out of the network. DOIT anticipates this option would allow at least 15 additional towns to be added under long-term contracts.

- Same as Option 1, plus minimal growth
- Secure 30 month contracts for all operating costs
- Transition monthly serve fees to longer term contract options
- Create long term agreement for operating support
- Adjust backbone for minimal changes over 30 months
- Add 15 or more K-12 sites to the existing deployment

Option 3 – Continue Planned Growth Plan & Commitment for Additional funds in FY'04-05

This final approach continues under the current planning to complete the network by June, 2004. It assumes that at least $20,000,000 of the bond funds and at least $10M of the requested biennial operating funds are budgeted and allocated for FY'04-05. This approach allows the network build-out to continue as originally planned with completion of the entire state in FY'04. Beginning in late FY '05, the project would transition into a completely operational mode, with ongoing operating support and no additional bond requirements.

In this scenario, the CEN team would use FY'03 bond funds requested for release in November, 2002 to continue operation of existing sites and also to connect an additional 39 school districts and 10 higher education campuses between February 1st and August 30th, 2003. The CEN team would also install connections to approximately 60 libraries in new areas and areas already served by the CEN. With a 6-9 month lead-time between issuance of orders and delivery of network services by the private vendors, the CEN team anticipates that 70 districts or approximately 40% of Connecticut would be connected to the CEN for fall, 2003. At that point, the Universal Service Fund supplemented FY'04 effort would begin and completion of the State would occur by July 1st, 2004.

CEN daily operations would continue to rely on the FY'03 "network expansion" bond funding to continue operating, project management and transitional costs during the build-out of the network. In that regard***, release of FY'03 would be a critical component of ongoing operation***. The release of funding for FY'03-04 will allow payment of staff support, contract engineering, equipment maintenance, SBC network costs, and Internet service costs that have been deferred to this date during the current Fiscal year.[8]

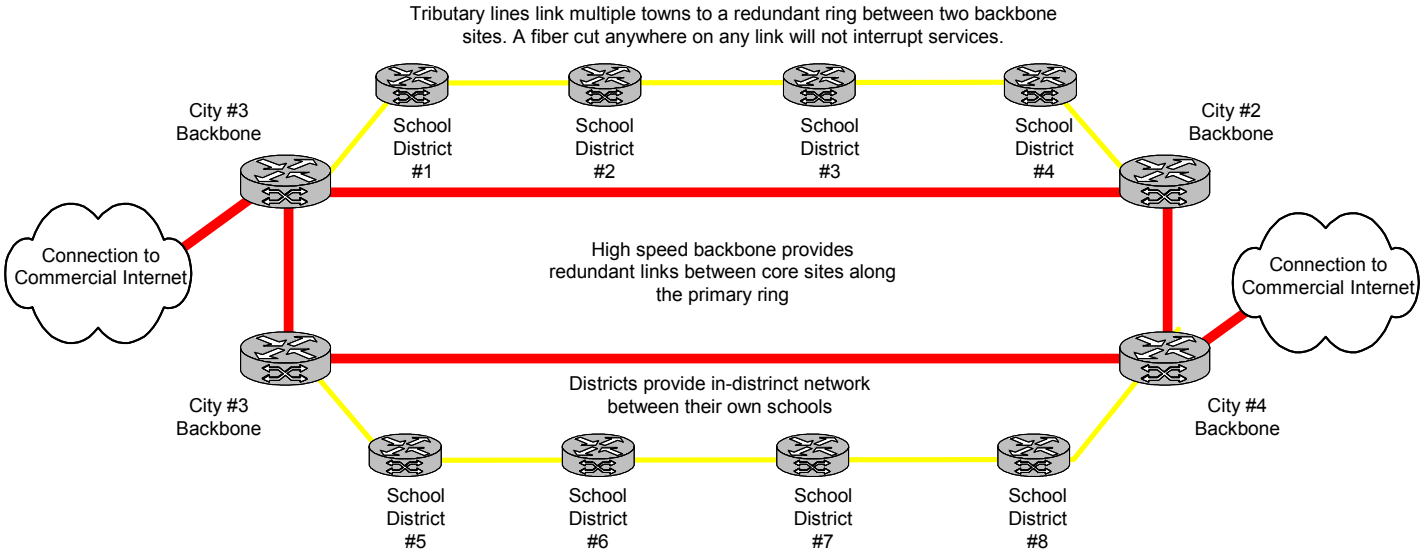
Activities that will commence upon release of the FY'03 funds are:

[8] Existing carry-over reserves from FY'01 are not sufficient to continue current level services through June 30th, 2003. Certain portions of the Network's annual operating expenses have not been paid to date during this fiscal year.

- Renew equipment maintenance contracts that expire annually July 1.
- Continue payments of monthly service charges for network circuits and Internet connectivity.
- Execute the first portion of a 5-year enhanced services contract for CEN participants
- Order additional circuits and services to approximately 40 towns and 60 libraries
- Make application to connect the Connecticut CEN schools as an Internet2 Sponsored Participant
- Investigate educational content activities with CTN, CPTV, and Internet2.
- Investigate and pilot collaborative educational training opportunities using the CEN for first responder, public safety, public health and homeland security purposes.

Addendum 2

Example of CEN Network Rings



Example of Traditional Non-Redundant Network